



Cambridge International AS & A Level

MARINE SCIENCE

9693/03

Paper 3 Structured Questions

October/November 2020

MARK SCHEME

Maximum Mark: 50

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

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This document consists of **11** printed pages.

PUBLISHED**Generic Marking Principles**

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

PUBLISHED**GENERIC MARKING PRINCIPLE 5:**

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

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- This mark scheme will use the following abbreviations:

;	separates marking points
/	separates alternatives within a marking point
()	contents of brackets are not required but should be implied / the contents set the context of the answer
R	reject
A	accept (answers that are correctly cued by the question or guidance you have received)
I	ignore (mark as if this material was not present)
AW	alternative wording (where responses vary more than usual, accept other ways of expressing the same idea)
AVP	alternative valid point (where a greater than usual variety of responses is expected)
ORA	or reverse argument
<u>underline</u>	actual word underlined must be used by the candidate (grammatical variants excepted)
MAX	indicates the maximum number of marks that can be awarded
+	statements on both sides of the + are needed for that mark
OR	separates two different routes to a mark point and only one should be awarded
ECF	error carried forward (credit an operation from a previous incorrect response)

Question	Answer	Marks
1(a)(i)	<i>any 1 of:</i> partially enclosed (tidal) body of water ; where freshwater / river meets the sea ;	1
1(a)(ii)	<i>any 4 of:</i> ref. to need for light for <u>photosynthesis</u> ; clear water allows more light to penetrate ; ORA light (intensity) decreases with depth ; ORA (shallow water) is warmer, so increased enzyme activity (for photosynthesis) ; (shallow water) more CO ₂ available due to dissolution at surface ; (absent from deep water because) chlorophyll absorbs red light (which does not penetrate far) / range of wavelengths of light available decreases with depth ;	4
1(a)(iii)	<i>any pair of:</i> (long flexible) leaves slow down current ; so more silt falls to bottom ; OR silt is held by roots / roots bind substrate ; water clearer, so more photosynthesis (and increased growth) ;	2
1(b)(i)	<i>any 1 of:</i> dredging damaged / destroyed the <u>seagrass</u> beds ; dredging released silt / made water cloudy, so unsuitable for oyster growth ;	1
1(b)(ii)	<i>any 4 of:</i> seagrass is still being damaged by oyster farming ; increasing the oyster beds will damage more seagrass ; seagrass in an important habitat / nursery area for fish / area for fish to lay eggs ; seagrass provides food source for fish / protection from predators ; seagrass provides oxygen for <u>respiration</u> in marine animals / oysters ; reduced area for fishing / harder to access fishing areas ; fish numbers will decrease, so less income for fishermen ;	4

Question	Answer	Marks
2(a)(i)	3: <u>juveniles</u> ; 5: <u>sperm</u> ;	2
2(a)(ii)	advantage: <i>any 1 of:</i> <i>idea of:</i> more cross fertilisation ; <i>idea of:</i> some will escape predation ; <i>idea of:</i> no need to pair up with a mate ; <i>disadvantage: any 1 of:</i> <i>idea of:</i> high energy demand to produce eggs ; <i>idea of:</i> more wastage ; <i>idea of:</i> high rate of predation ;	2
2(a)(iii)	<i>any 2 of:</i> <i>idea of:</i> larger ; more energy reserves ; so can make / store more eggs (to release over time) ;	2
2(b)	<i>any 2 of:</i> (salmon) spawn in fresh water / tuna spawn in seawater ; (salmon) make nest / tuna have no nest ; (salmon) shed gametes in the nest / tuna into surface of ocean ; (salmon) alevin have a yolk sac / tuna have planktonic larvae ; part of life cycle (of salmon) in fresh water / tuna entirely in the sea ;	2
2(c)(i)	continuous swimming uses a lot of energy ; <i>idea that:</i> food supplies raw material / fuel for <u>respiration</u> ;	2
2(c)(ii)	<i>any 3 of:</i> ref. to ram ventilation ; swim with mouth open ; water (continuously) flows in through mouth and (out) over gills ; maintains diffusion gradient ; correct ref. to counter current ;	3

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Question	Answer			Marks
3(a)	any 1 of: imposing fines ; confiscation of boats / fishing gear / removal of fishing licence ; imprisonment ;			1
3(b)	monitoring method	advantage	disadvantage	2
	logbooks	cheap / can be used on any fishing vessel in any language.	catch data might not be entered / not be entered accurately ;	
	patrol aircraft	can cover a large area / can patrol borders / closed areas ;	cannot arrest crew, cannot inspect catch / gear	
	;;			
3(c)(i)	any 2 of: AIS has gaps in data / combined data has no gaps OR position of fishing vessel <u>continually</u> visible using combined data ; shows there was <u>no</u> fishing in the marine conservation area ;			2
3(c)(ii)	any 1 of: so that they can prove that they are not involved in illegal fishing ; they will have access to more markets / trusted more by consumers (as catch is fully traceable) ;			1
3(d)(i)	any 2 of: fishing boats do not have to return to ports / allows fishing boats to stay out at sea for longer ; allows fishing boats to fish further from shore / in remote areas of ocean ; fish can be processed immediately / fish processed and stored on factory ship ; fishing boats have less distance to transport catch ; fishing boats can catch more (as they do not need to store fish / waste time returning to port) ;			2

Question	Answer	Marks
3(d)(ii)	<i>(little evidence) max 1 of:</i> AIS does not provide a continuous signal ; some signal loss may be due to loss of satellite signal (due to adverse weather) ; <i>idea of:</i> fishing boat might be in restricted area but not fishing ; <i>(strong evidence) max 2 of:</i> a few cases occur inside the restricted zone, suggesting illegal fishing ; very high levels of signal loss at border suggest high levels of catch transfer takes place here ; very high levels of signal loss at border suggest fishing boats fish inside restricted fishing zone, then move out of restricted fishing zone ;	3

Question	Answer	Marks
4(a)	<i>any 3 of:</i> <i>idea of:</i> commercial fishing has overfished / is unsustainable / aquaculture is sustainable ; world population is increasing / demand is increasing ; aquaculture makes up the shortfall in food supply ; more species now raised by aquaculture ; <i>idea of:</i> quotas reducing allowable catch ;	3
4(b)(i)	<i>any 4 of, but must have a minimum of 1 from each:</i> <i>clean water</i> filters remove solid waste ; filters remove nitrates / convert nitrates to nitrogen gas ; biological filters remove toxins / ammonia ; ultraviolet light kills disease organisms / microbes ; <i>efficiency of food use</i> mechanical feeders <u>measure</u> / <u>control</u> feed supply ; all food is eaten so less waste ; <i>disease control</i> ultraviolet light kills disease organisms / microbes ;	4

Question	Answer	Marks
4(b)(ii)	<i>any 2 of:</i> supply of stock feed availability availability of labour suitable site guaranteed market / market demand return on investment disease management ; ;	2
4(b)(iii)	<i>any 2 of:</i> expensive to set up / maintain ; needs trained technicians to maintain / run the system ; has a high energy / power consumption ; release CO ₂ that could contribute to global warming ;	2
4(b)(iv)	<i>any 2 of:</i> reduces use of water from the environment ; reduces the use of antibiotics / chemicals for disease control ; reduces risk of escaped fish ; reduces risk of disease spreading to the wild populations ; reduces fish excreta / waste food into the environment ; filtered solid used for hydroponics ;	2
4(c)	<i>any 3 of:</i> <i>idea of:</i> predated easily (as not used to predators) ; <i>idea of:</i> used to be being fed so difficulty in finding food / poor competitors for food ; <i>idea of:</i> more likely to be infected by disease / parasites ; <i>idea of:</i> poor competitors for mates ; <i>idea of:</i> not the same genetic profile as wild population ; not adapted to local conditions ; original issue that caused population to decrease may still be present ;	3

Question	Answer	Marks
5(a)(i)	Coriolis (effect) ;	1
5(a)(ii)	<i>any 2 of:</i> wind temperature salinity density shape of sea bed ;	1
5(a)(iii)	<i>idea of:</i> currents circulate plastic to centre of gyre ;	1
5(b)(i)	603 (years) ;;	2
5(b)(ii)	fishing line <u>swallowed</u> ; blocking intestine (so animal starves) ; OR animal gets <u>tangled</u> in fishing line ; cannot surface to breathe, (so drowns) / cannot move to find food, (so starves) / causes cuts which become infected / cannot move to escape predators ;	2
5(c)	<i>any 3 of:</i> shellfish eat phytoplankton and therefore microplastics ; <u>many</u> shellfish are eaten by consumers ; so microplastics become more concentrated at each trophic level / biomagnification occurs ; humans are at the top of the food chain, so will contain most microplastics ; ref. to unknown (long-term) health effects of eating microplastics ; <i>idea that</i> organisms fill up with plastic, (so starve) OR ref. to bioaccumulation ;	3
5(d)	<i>any 4 of:</i> less waste product from shellfish production ; break down naturally / biodegradable, (so reducing environmental pollution) ; (break down) so do not build up in the environment ; do not release toxic compounds (to pollute the environment) ; recycles minerals / calcium / phosphates (into the environment) ; could be used as a food source (by marine organisms / bacteria) ; AVP ;	4

Question	Answer	Marks
6(a)	<i>any 2 of:</i> <i>idea of:</i> ownership / local involvement <u>increases care</u> for the environment ; <i>idea of:</i> fewer conflicts over the use of resources ; <i>idea of:</i> co-operation brings community together in deciding how to use resources ; <i>idea of:</i> expertise from the conservation organisation helps educate the local communities ; <i>idea of:</i> local, so focuses on issues in that area / relevant to specific needs of area ;	2
6(b)	<i>any 2 of:</i> reefs provide a <u>habitat</u> for a variety of organisms / fish / invertebrates ; reefs are nursery area for a range of organisms / fish / invertebrates ; spawning grounds / feeding areas for many <u>endangered species</u> / named examples ; dissipate wave energy / coastal protection ; coral reefs are a source of income from tourism ; coral reefs act as carbon sinks, so reduce effects of global warming ;	2
6(c)(i)	<i>any 3 of, but must have at least 1 from each:</i> <i>bleaching :</i> indication of how much of the coral is dead ; indicates possible places where damage / pollution has occurred ; any decreases in the total percentage / patches of bleaching indicates the coral recovery / recolonisation by zooxanthellae ; ORA <i>number and population of species :</i> indication of biodiversity ; increase in number of different species indicates recovery as more habitats AW available ; increase in populations indicates recovery as coral able to support more organisms ;	3
6(c)(ii)	tourists want to visit the reefs to dive / snorkel / view marine organisms or tourism encouraged as it helps economy ; LMMA managers want to control how the reef is used / protect the reef from damage by visitors / manage access ;	2